flooded near the mouth of the Missouri. In the city the stage was not high enough to cause any inconvenience.

SPECIAL NOTES.

Iowa.—The feature of the month was a protracted period of heavy precipitation, beginning late on the 6th and lasting until the early morning of the 11th. Undoubtedly it was one of the most lengthy of its nature on record for this area. On the 9th, over the northern part of the area, the rain turned to snow and there followed the heaviest snowstorm of record. Upwards of 20 inches fell over a considerable territory. The snow was very moist and much damage was caused to trees, and in Sioux City car service had to be suspended for 36 hours. Also in that city the telephone and lighting services were badly demoralized. The snow melted rather slowly and some remained on the ground for four days. The variation in temperature on the 8th, 9th, and 10th in northwestern Iowa was remarkably small; in fact, it is believed to have been unprecedented. For the entire period of 72 hours the range between the maximum and the minimum was not more than 6°. At Inwood, where the greatest precipitation occurred, it was but 2°, the maximum being 33° and the minimum 31°.

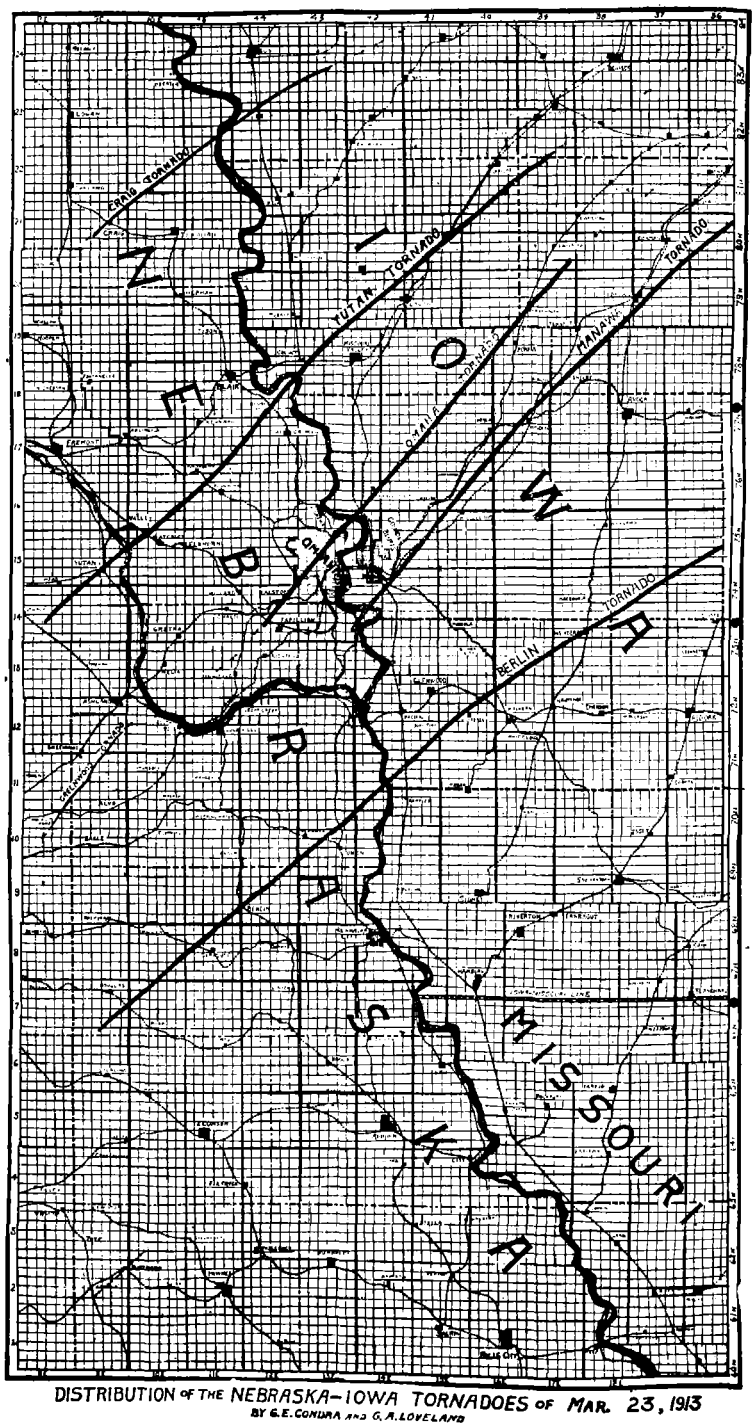
South Dakota.—At Yankton about 13 inches of moist snow fell in the 48 hours ending 9.30 p. m. of the 10th, causing much delay to railway traffic and the complete severance of telegraphic and telephonic communication for two days. The snow, however, was of incalculable benefit to farming interests.

IOWA-NEBRASKA TORNADOES OF MARCH 23, 1913.

(By G. A. LOVELAND, Junior Professor, U. S. Weather Bureau.)

The morning weather map of March 23, 1913, showed a well defined area of low barometric pressure covering the southern Rocky Mountain region, with the center in northern Colorado and pressure slightly less than 29.40 inches. This area moved eastward and slightly northward during the day, across Kansas and Nebraska, and at the evening observation the center was in western Iowa, with barometric pressure between 29.25 and 29.30 inches. In the late afternoon, from 4 to 6 p. m., central time, the center of the area seems to have moved across eastern Nebraska, along a line somewhat north, but probably not far north, of Lincoln and Omaha. Between 5 and 6 p. m. a large area, covering some 10 or 12 counties in eastern and southern Nebraska, was covered by a layer of very unstable air. The unusual appearance and motion of the clouds were very generally noticed, and indicated a violent disturbance.

A series of violent storms developed over eastern Nebraska and moved northeastward into Iowa along paths shown on the accompanying chart. They appeared as well defined tornadoes in Nebraska, with the funnel-shaped cloud and usual accompanying characteristics of such storms, but Mr. George M. Chappel, section director at Des Moines, Iowa, thinks that "most of the manifestations on this side of the river (Iowa) indicated, over the large part of these courses, only straight line squalls."



DISTRIBUTION OF THE NEBRASKA-IOWA TORNADOES OF MAR. 23, 1913
BY G.E. CONDRA AND G.A. LOVELAND

The more northerly of these storms developed earliest in the day. The Craig storm crossed the river about 5.35 p. m. The Yutan storm, the next one south, crossed the river near DeSoto at 5.45 p. m. The Omaha storm was at the river about 6 p. m., the Manawa storm at 6.15 p. m., and the Berlin storm at 6.35 p. m.

As the chart shows, the storms moved very nearly northeastward and were not affected by the valleys or hills over which they passed. The Berlin storm seems not to have left the ground, the path of destruction being continuous, as shown by its action on the ground even when buildings or trees were absent. A slight fall of hail preceded this storm and quite generally attracted attention to its approach, and thus many persons were in the cellars and escaped injury, although 13 were killed in Nebraska. The rainfall was not heavy, being generally estimated at from a fourth to a half inch. The rainfall was measured at two places near the path, viz, Syracuse, where 0.38 inch fell, and Weepingwater, where 0.47 inch fell. This storm appeared to have had more force than the one which passed through Omaha with such disastrous results, a full description of which appeared in the Review for March.

Some destruction resulted from storms in Nebraska west of those indicated on the chart, one in Pawnee County and one in southwestern Lancaster County near Kramer. This may have been the extreme western end of the storm which later developed and passed near Greenwood.

Nineteen lives were lost in Nebraska in the storm that destroyed Yutan and moved northeastward to the Missouri River. This storm, fortunately, missed several small cities, and it appears to have had less energy than either the Berlin or the Omaha storms. No careful estimate of the property loss has been made.